subject of the Shorter Catechism. It was, therefore, no surprise to some when he and Balfour Stewart proved to be joint authors of "The Unseen Universe" (first printed privately in 1875). This remarkable book reflects the extraordinary width of Tait's knowledge and of his interest in things known and unknown; its success, so far as its immediate object was concerned, is best described by Tait himself in an obituary notice of Balfour Stewart.

"It has passed through many editions, and has experienced every variety of reception—from hearty welcome and approval in some quarters to the extremes of fierce denunciation, or of lofty scorn, in others. Whatever its merits or demerits, it has undoubtedly been successful in one of its main objects, viz. in showing how baseless is the common statement that 'Science is incompatible with Religion.' It calls attention to the simple fact, ignored by too many professed instructors of the public, that human science has its limits, and that there are realities with which it is altogether incompetent to deal."

Tait's scientific memoirs are being republished in three goodly volumes by the Pitt Press, two of which have already appeared. It is therefore unnecessary to do more than allude to the most important of them. The subjects range over pure and applied mathematics and experimental physics. The majority of the mathematical papers are written in the quaternion notation, and this has undoubtedly prevented some of them from becoming so well known as they deserve to be. We may mention specially two papers on Fresnel's wave surface (1859); a series of papers on the properties of "nabla" (∇), and on the linear and vector function, extending from 1867 to 1900; on the rotation of a rigid body about a fixed point (1868)—a paper of great power and elegance, which exhibits Tait's mathematical power at its best; on Green's and other allied theorems (1870), on orthogonal isothermal surfaces (1872); on knots (1877, 1884, 1885), a series of three papers suggested by the problem of the possible configurations of a Thomson vortex atom. In the three classical papers last named he virtually creates a new chapter in the geometria situs, and is brought into relation with the work of Listing, for whom he had the greatest respect. To this subject he returns again in two subsequent papers: a note on a theorem in geometry of position (1880), and on Listing's topologie (1884).

His first experimental work was on ozone, in collaboration with Andrews (from 1856 to 1860). He also began to work with the same distinguished investigator on the compression of gases, but this was interrupted by his removal to Edinburgh in 1860. His memoir on thermal and electric conductivity contains the result of an elaborate series of experiments extending over ten years. The original idea of the method was due to Forbes, but the complete theory and the difficult details are the work of Tait and his pupils. The memoir on mirage is a remarkably elegant and effective combination of experimental and mathematical methods, and is, perhaps, the best example of Tait's work as a natural philosopher. His investigation of the pressure errors of the *Challenger* thermometers was an intricate piece of experimental work extending over several years. It led him into the discussion of the compressibility of liquids, to which are devoted five memoirs (1893–1898). This investigation brought him into close relations with the French physicist Amagat, for whom he had a great regard. Much work is embodied in five papers (1886–1892) on the foundations of the kinetic theory of gases, in which he endeavours to analyse into their logically simplest elements the first principles of a difficult and much-debated subject. His interest in the game of golf produced three important papers on impact (1888–1892), and two on the path of a rotating spherical projectile. On this subject he also wrote a series of popular articles which were widely read and appreciated.

Besides his text-books and original memoirs, Tait contributed assiduously to the current scientific literature of his day. We may mention in particular his article "On Energy" in *Good Words* (1863); his memoirs of Hamilton (*North British Review*, 1866) and of Andrews (along with Crum Brown, 1888); his famous lecture "On Force" (British Association, 1876), so cleverly parodied in Maxwell's poem—

> "Ye British asses who expect to hear
> Ever some new thing, &c.";

his article "On the Teaching of Natural Philosophy" (*Contemporary Review*, 1878); his fine appreciation of Maxwell's scientific work (NATURE, vol. xxi. p. 317, February 5, 1880), and his various contributions to the ninth edition of the "Encyclopædia Britannica."

Limitations of time and space, and others besides, make it impossible to attempt here any appreciation of the relative importance of Tait's original contributions to the science of the Victorian age. For one thing, the sense of bereavement is too near to us to permit of the necessary historical abstraction. Nor is this the time to enlarge on the polemical discussions in which Tait took part. Ready to take a blow, he did not always spare his strength in giving one, and his opponents did not always relish his rough play. It may be doubted whether many of them carried for long any resulting bitterness; but undoubtedly some of them were led, temporarily at least, greatly to mistake his character. Personal contact with him at once dissipated any such misconception. To feel the magic of his personality to the full it was necessary to visit him in the little room at the back of his house, No. 38 George Square, Edinburgh, the Spartan simplicity of whose plain deal furniture and book-shelves, unpainted, unvarnished, ink-spotted, littered with books and pamphlets and with piles of manuscript bristling with quaternion symbols, was so finely in tune with the tall, rugged figure, the loud, hearty greeting and the radiant, welcoming smile of the kindly host. Ten minutes in that sanctum would have made a friend of his bitterest foe, and the conquest would have been mutual and permanent, for it seemed to be an axiom of Tait's that a man who had become his friend could sin no more. Thither came at various times Joule, Andrews, Kelvin, Stokes, v. Helmholtz, Rankine, Clerk-Maxwell, Balfour Stewart, Rowland, the Wiedemanns (father and son), Adams, Newcomb, Huggins, Newton, Lockyer, Hamilton (at least in the spirit), Cayley, Sylvester, Hermite, Cremona, Clifford, Klein, Bierens de Haan and many more, the majority, alas! now departed like their common friend. It has been the main part of our endeavour to indicate, faintly at least, some of the qualities that attracted and retained such a galaxy of friends; the most potent of all was doubtless the oldest, the simplest ground of liking—he was loved so well because he loved so much.

G. CHRYSTAL.

NOTES.

THE Hughes Bennett laboratory of experimental physiology, which has been added to the University of Edinburgh by Mrs. Cox as a memorial of the work of her father, Prof. J. Hughes Bennett, in connection with medical education, was formally handed over to the University on Saturday last. The addition comprises a large laboratory equipped with appliances for practical work in experimental physiology by individual students, and a small lecture theatre for class demonstrations. The memorial character of the new laboratory is indicated by a bronze bas relief representing Hughes Bennett, which has been executed by Mr. MacGillivray. This is fixed to one of the walls of the laboratory, with an inscription below it commemorating the fact that Hughes Bennett was the first teacher in

Scotland to apply the microscope to the clinical investigation of disease. At the opening ceremony on Saturday, Sir J. Burdon Sanderson, Bart., formerly a pupil of Bennett, delivered an address upon his life and work. Referring to the work to be done in the laboratory, he said, "The laboratory is intended for researches in experimental physiology, by which term was meant the application of the methods derived from physics and chemistry to the investigation of vital phenomena—*i.e.* to the processes which were peculiar to the living organisms. Bennett used to teach in the old days that the scientific method of study was always comparative. It consisted in comparing the unknown with the known, the more complicated phenomena of disease with the simpler ones of health, in bringing their imperfect understanding of vital processes into relation with the clearer notions of natural philosophy. It was thus that physiology, which was at first little more than an introductory study to that of medicine, had been built up into an independent branch of natural knowledge which has its own special aim, the elucidation of the nature of vital processes, but derived its methods of investigation from physics and chemistry. He was sure that all present would cordially join with him in wishing Prof. Schafer success in carrying out the noble purpose to which Mrs. Cox has devoted her munificent gift." Prof. J. G. McKendrick, who was an assistant of Bennett's thirty years ago, proposed a vote of thanks to Sir John Burdon Sanderson, and it was seconded by Sir John Batty Tuke. Sir William Muir, in closing the proceedings, expressed the indebtedness of the University to Mrs. Cox for her munificence.

WE regret to see the announcement of the death of Miss E. A. Ormerod, whose studies of injurious insects for many years made her a distinguished authority on agricultural entomology. Miss Ormerod was seventy-four years of age.

THE Paris correspondent of the *Times* announces the death of the eminent zoologist, Baron Henri de Lacaze Duthiers, at the age of eighty years. M. de Lacaze Duthiers began life as a medical student in Paris, and in 1854 became professor of zoology at Lille. After his appointment in 1862 to a mission in the Mediterranean, he wrote his famous book "Le Corail." Three years later he became professor of natural history at the Museum, and in 1868 was given a chair at the Sorbonne. In 1871 he succeeded M. Longet at the Academy of Sciences. His activity in the foundation of marine laboratories at Roscoff and at Banyuls-sur-Mer—institutions which were partially endowed by himself—was not the least of his contributions to science.

THE council of the British Medical Association has awarded the Stewart prize to Dr. Patrick Manson, F.R.S. The prize was founded by the late Dr. A. P. Stewart, to be awarded biennially for the recognition of important work already done, or of researches instituted, and promising good results regarding the origin, spread and prevention of epidemic disease with a view to encourage the continuance of the same. It consists of an illuminated certificate and a cheque for 50*l*. The Scientific Grants Committee of the Association has allowed 350*l*. for scientific grants and 650*l*. for research scholarships. In the latter sum is included the separate scholarship known as the (200*l*.) Ernest Hart memorial scholarship. The total amount which has been spent in scientific research through this committee since its institution in 1874 is 15,998*l*., independently of 1650*l*. granted to societies and bodies outside the Association.

IN connection with the subject of the subjective lowering of musical pitch, Mr. Harding's theory referring to it (p. 103), and a suggestion made by Mr. E. C. Sherwood (p. 233), Mr. G. W. Hemming thinks the following experiment should be made by some one with the necessary instruments :—"Set siren A to middle C. Set siren B (say) half a tone lower. Sound A loud and B soft. Then by gradually varying the loudness of one of them a point should be reached at which they would appear *to the ear* as a unison. If this cannot be done, there must be some error in Mr. Harding's theory." Mr. Hemming's experiment would test Mr. Sherwood's point, but it does not seem to be able to settle the original statements. "These," writes Mr. Harding, "can easily be tested by means of *one* siren rotating on a table, the ear of the observer being alternately lowered towards, and raised from, the table (which intensifies by its resonance); a point will soon be found beyond which the sound appears flattened."

THE *Revue générale des Sciences* for July 15 contains an interesting article by M. André Blondel on oscillographs. The principles of these instruments have already been described in NATURE (vol. lxiii. p. 142), more particularly in reference to the various types of bifilar oscillographs worked out by Mr. Duddell. M. Blondel gives descriptions of the two types of instrument which he has himself perfected and used with such great success in his researches on the arc, namely a bifilar oscillograph similar to those of Mr. Duddell and an oscillograph in which the moving part consists of a ribbon of soft iron. In a comparison of the relative merits of the two different types, M. Blondel considers that the bifilar instrument is the more suitable for laboratory work on account of its great sensibility and accuracy, but that the soft iron type is to be preferred for industrial purposes as it is less fragile and more portable. None of M. Blondel's instruments seem, however, to be so compact as the small portable pattern recently shown by Mr. Duddell at the Institution of Electrical Engineers. An ingenious point in the design of M. Blondel's instruments is that the vibrating parts for different purposes—projection or research work—are all made to fit into the same magnet, thus allowing a simple and rapid change to be made according as the instrument is required for one purpose or the other. A continuation of the article, dealing with the application of oscillographs, is promised.

IN *Symons's Meteorological Magazine* for this month, Mr. W. H. Dines contributes a paper on the fallacy of one of the explanations given in meteorological works as to the unexplained double diurnal barometer wave. The fallacy referred to lies in assuming that the inertia of the air can act like a containing vessel with only a small hole in it. If a barometer were placed in a sealed vessel, the changes in level of the mercury would follow the changes in the temperature of the air inside, but if a sudden change of temperature occurs in the lower layers of air, or a sudden increase of vapour tension, an oscillation of the barometer would occur, but with only an extremely small period, instead of lasting for hours. The author remarks that warmth reduces the height of the barometer, provided there is time for the upper part of the warmed column to roll off; but could a space be enclosed by a wall reaching to the upper limit of the air, no variations of temperature in the enclosed space could affect the barometer in the slightest degree. A mathematical statement of the question is given for any one who wishes to go into the matter. Dr. Mill gives a short note on the recent extreme heat in New York. The daily maxima do not appear to have exceeded 100° in the shade, but the night minima were frequently more than 80°, so that little difference of temperature was perceptible indoors between day and night. The humidity was also exceptionally high. It is said that special permission was given for people to sleep in the public parks. The worst part of the heat wave was from June 28 to July 4, during which time the deaths in the streets were so numerous that many bodies had to be buried without identification.

WE have received from Mr. J. Elster and Mr. H. Geitel an account of their further experiments on electrical dispersion in closed air spaces (*Physikalische Zeitschrift*, No. 38). They,

and Mr. C. T. R. Wilson of Cambridge, had previously arrived independently at the result that the air, notwithstanding the exclusion of all known influences that increase its electric conductibility, is by no means a perfect insulator, owing to the existence of ions, and that the rate of dissipation increased beyond its original amount in the course of a few days. A possible explanation of this behaviour seemed to be that dust-laden air is a worse conductor than air which is dust-free; it might be assumed that the increase of conductibility was due to a gradual self-purification of the air by the deposition of the dust-particles. To a certain extent this assumption is correct, but as it appeared doubtful that the dissipation was due solely to the air becoming dust-free, artificial means of purifying the air were tried. A minute description of the apparatus employed is contained in the article in question. The principal result arrived at is that the gradual increase of electric conductibility observed in closed air-spaces up to a certain limiting value can only be very partially due to the deposition of dust, or to variations of humidity. This is shown in a striking manner in the abnormally high conductibility of the air in cavities, and in cellars which have been closed for some time.

SIR W. J. L. WHARTON, K.C.B., the hydrographer, has presented his report upon the Admiralty surveys made during the year 1900, and it is published as a Blue Book. H.M. surveying vessels were all fully employed and good progress was made in each survey; 1167 miles of coast line were charted, and an area of 10,733 miles was sounded during the year. Dr. Fowler and an assistant were taken on board the *Research* in order to carry out, at the request of the Royal Society, zoological investigations in deep water about 150 miles south-westward of Ushant, the object of the observations being the determination of the vertical limits at which various forms of marine life exist. The surveying vessel, *Gladiator*, was taken to Larne Harbour, Ireland, with the view of ascertaining the truth of reports that the Maiden Rocks cause serious local magnetic disturbances. No such effect was, however, found. A chain of magnetic observations for variation was made at sea by the officers of H.M.S. *Rambler*, on the east coast of Africa off Durban, Beira, Mozambique, Zanzibar, Guardafui and the Arabian coast. The observations are said to show that considerable alteration has taken place of late years in the rate of change of the magnetic declination. During a voyage from Albany to Tasmania, H.M.S. *Penguin* obtained deep-sea soundings at regular intervals 130 miles apart. The greatest depth obtained was 3040 fathoms.

THE composition of alloys employed for bronze medals is referred to by Sir W. C. Roberts-Austen, K.C.B., in the report of the Deputy Master and Comptroller of the Royal Mint. He points out that of late years a change has gradually been effected in the metal used for striking medals which are known by the general name of bronze. Until comparatively recently such medals were invariably struck in copper, which subsequently received a superficial coating mainly consisting of oxide of copper, and the medal was said to be "bronzed." Such a "patina" was formerly imparted to the copper medal by heating it in contact with oxide of iron. The Japanese have long shown their remarkable skill as art-metal workers by employing a wet method, by the aid of which a wide range of shades of brown can be imparted to copper. The solutions are used boiling, and a variety of verdigris, known as "Rokusho," and sulphate of copper are their main constituents. The Japanese, moreover, are very successful in imparting a more or less translucent but permanent coating to the copper, which in fine examples of their art reveals the crystalline structure of the metal beneath the "patina." Sir William Roberts-Austen states that in the years 1897-98 more than 28,500 medals, in commemoration of the Jubilee of Her Majesty the late Queen, were so treated, and the specimens which have been preserved in the Mint show no diminution in the brilliancy of the tints which were originally imparted to them. Many European mints are following the Paris Mint in efforts to replace pure copper by copper alloyed with other metals. Analyses of coins of the reign of Hadrian and Trajan show that the alloys contained about 87 or 88 per cent. of copper and 7 to 11 per cent. of zinc, the remainder being made up of tin, lead, iron and silver, with traces of arsenic and antimony. Sir William Roberts-Austen remarks that modern medallists are working with alloys which resemble those from which the coins mentioned were struck, so that the medallist of to-day is returning to the ideas developed in ancient Rome.

A NEW rangefinder, invented by Prof. G. Forbes, F.R.S., was on view at the Bisley rifle meeting. The want of a rangefinder that is portable and workable, that has not more than two per cent. inaccuracy at 3000 yards, and that does not require a telescope so large as to require a stand, is much felt for infantry work, especially with maxims. All these conditions, says the *Times* correspondent at the meeting, are met by the one in question. It consists of a folding aluminium base, six feet in length, which can be folded in the middle and strapped across the back, and a field-glass carried in the usual fashion. The base is a square tube, hinged at the middle. Each half has at each end a doubly reflecting glass prism. The rays of light from a distant object strike the outer pair of these four prisms, are reflected at right angles along each tube, and are then reflected at the two middle prisms into the two telescopes of the binocular, which can be easily fixed to the centre of the base when in use in directions parallel to the original rays intercepted by the outer prisms. By the measurement of the angle between these rays the distance of the object looked at is determined. This angle is measured by two vertical wires, one in each telescope, seen by the two eyes. One of these wires is fixed, the other moved by a micrometer screw until the two wires appear as one at the same time that the object is seen distinctly. The instrument gives the distance, in the hands of an ordinary observer, at 3000 yards to within 60 yards, at 1500 yards to 15 yards. The 6 ft. base folds to 3 ft. 3 in. and weighs under 3 lb.

IN the *Revue générale des Sciences*, Dr. Guillaume, of the Bureau des poids et mesures, discusses the laws of radiation in reference to their application to incandescent mantles. Dr. Guillaume considers that the high intensity of the Auer light is due partly to the fact that the coefficient of radiation of the mantle is exceptionally high towards the blue end of the flame, partly to the temperature of the flame itself being, as the author shows, higher than has been commonly supposed, and partly to the density of the radiating substance being largely in excess of that of the carbon in an ordinary combustion flame. The high temperature of the mantle is probably attributable to the fact that its coefficient of radiation decreases rapidly towards the red end and infra-red of the spectrum, so that the total radiation is relatively small in comparison with the radiation of rays of short wave-length. Dr. Guillaume quotes the work of Messrs. Le Chatelier and Boudouard, and suggests that the coefficient of radiation of the mantles for infra-red rays presents an interesting field of study. It seems probable that as the wave-length increases, the coefficient may decrease to a minimum and may increase again in a region considerably distant from the visible spectrum. The substances used by von Welsbach thus exhibit gaps in an easily explored region of their emission-spectrum, and we may expect to obtain, with little difficulty, results differing considerably from those furnished by the study of substances whose radiation is more nearly uniform.

THE skin of the okapi, the new mammal discovered by Sir Harry Johnston in the Semliki Forest between Lakes Albert

and Albert Edward, has been mounted for the Natural History branch of the British Museum by Mr. Rowland Ward, of Piccadilly. For a time it will be exhibited in the North Hall, among the domesticated animals, but will eventually be placed alongside its nearest living relatives, the giraffes, in the lower mammal gallery. The skin and two skulls were recently exhibited by the Director of the Museum at an evening meeting of the Zoological Society, on which occasion the name Okapia was proposed for this very remarkable mammal, the specific title *johnstoni*, previously suggested by Mr. Sclater on the evidence of two fragments of skin, being adopted. As now mounted, the okapi presents a considerable resemblance in form to a small, short-limbed and short-necked giraffe, although furnished with the large ears characteristic of all forest-dwelling animals, and with an absolutely peculiar type of coloration. No such important discovery has occurred since the giant panda (Æluropus) was made known to the scientific world in the 'sixties of last century. Prof. Ray Lankester's description of this most interesting animal will be anxiously awaited by all naturalists.

WITH no less than seven reports and other technical documents before him, the writer of the article on the "Decay of our Sea Fisheries" in the July issue of the *Quarterly Review* takes a very serious, not to say pessimistic, view of the situation, and deplores the lack of interest in the fishing industry exhibited by Parliament. It is urged that, with far larger interests at stake, we spend much less money on inquiries connected with our fish-supply than other nations, and that the case for interference, based on the falling-off in the yield of inshore-grounds, is fully established. In this respect, indeed, we are suffering from an improvidence which would have been absolutely fatal in other industries; and the one excuse that can be made for legislative inactivity is that our knowledge of the life-history of our food-fishes is at present far too incomplete to permit of the drawing-up of really effectual regulations and amendments. Trawling as now practised is unhesitatingly condemned; while the importance of returning to the sea the spawn of newly-caught fish is strongly urged. There is, however, another aspect of the subject which has received too little attention. This is the great increase which, owing to protection, has of late years taken place in the numbers of our sea-birds. "No one," writes the author, "who has any sense of fairness blames the trout-hatcher for dealing summarily with the herons, otters, chub, pike and eels that invade his stews; and, if it becomes clear that there are no longer fish enough for both ourselves and the cormorants, it may be in like manner necessary to decide that charity shall begin, and end, at home." It may be added that attention is drawn to the value and importance of the researches carried on by the Liverpool Marine Biological Association and kindred bodies.

IN their Report for the year 1900 the executive committee announce that the New York Zoological Society is in a much more satisfactory financial position than it has ever been before, mainly owing to the liberality of the city. It is felt, however, that the Society does not receive adequate support from private citizens, and strenuous efforts are being made to raise the number of members to 3000, the total at the commencement of the present year being just short of 1000. The most important feature in the Report is an illustrated article by Mr. W. T. Hornaday on the wild sheep of America, the main object of this communication being the description of a hitherto unrecognised type inhabiting part of the Yukon valley. For this animal the name *Ovis fannini* is proposed. According to the illustration, it appears nearly allied to the white Alaskan bighorn, but has a large grey saddle on the back.

WE have received from the director of the Missouri Botanical Garden an elaborate paper on garden beans, by Mr. H. C. Irish. It deals with the species cultivated in America of the genera Phaseolus, Dolichos, Vigna, Glycine, and Vicia, and with their very numerous cultivated varieties, which are described in detail. Like so many of our cultivated fruits and vegetables, the scarlet runner and the kidney bean are unknown in the wild state. The broad bean is stated to be a native of Africa, and to be one of the oldest vegetables in cultivation. De Candolle says that it was cultivated in Europe in prehistoric times. The ten plates illustrate the very great variety in the seeds of the same species produced under cultivation.

IN the *Proceedings* of the Royal Academy of Sciences of Amsterdam, Dr. W. Burck has an interesting note respecting a possible provision of nature for preventing hybridisation in plants. He finds from experiment that the pollen-grains of different species vary very greatly in their sensitiveness to the action of the same chemical substance. Thus with some plants a very small quantity of lævulose greatly promotes the emission of the pollen-tubes, while with others it causes the pollen-grains to burst. Saccharose and dextrose have not the same effect as lævulose. He suggests that there may be present in the stigmatic secretion, not only substances which promote the emission of the pollen-tubes in that particular species, but also substances which act injuriously on the pollen of foreign species.

THE interesting discovery by Baron Toll of buried glaciers from the Glacial period, covered with more recent Post-Glacial deposits containing branches and roots of *Alnus fruticosa*, under the 74th degree of latitude, on the Great Lyakhoff Island of New Siberia, has already been mentioned several times in these columns. We have now received the thirty-second volume of the "Memoirs" (*Zapiski*) of the Russian Geographical Society, the first fascicule of which contains Baron Toll's memoir in full, with several interesting photographs. Three of these represent cliffs of glaciers ("fossil glaciers," as Baron Toll describes them), which are masses of ice, not of river ice, or of ice formed in clefts, but undoubtedly of a glacial ice, dating from the Glacial period, and covered with more recent layers of soil; while two other photographs represent layers of soil containing remains of *Alnus fruticosa* and a species of *Salix* deposited above the ice. The branches and the roots of the former are well seen on the photograph, while the catkins which were found by Baron Toll show that these trees, which now do not spread beyond 70° N. lat., grew on the New Siberian islands during the post-Glacial period. As to the mammoth, the rhinoceros and other extinct mammals, it seems impossible, since the researches of Fr. Schmidt, Tcherskiy, Bunge and Toll, not to accept the last author's conclusion, namely: "The mammoths and the other contemporary mammals lived on the spots where we now find their relics; they died out owing to a change in the physico-geographical conditions of the region. The bodies of these mammals, which have not died in consequence of some sudden catastrophe, were deposited in a cold region, partly on river terraces, and partly on the shores of lakes and on the surfaces of the glaciers, and there they were gradually buried in loam. They have been preserved in the same way as have been preserved the masses of ice underneath, owing to a permanent and perhaps increasing cold."

THOSE who are interested in the local antiquities, church and domestic architecture, folklore and antiquarian odds and ends of the counties of London, Middlesex, Essex, Herts, Bucks, Berks, Surrey and Kent, cannot do better than read *The Home Counties Magazine*, in which a number of brightly-written and well-illustrated articles on these various topics will be found.

THE Scottish archæologists should be happy, as they have a very useful bone of contention in the age of the crannog recently discovered at Dumbuck in the estuary of the Clyde. The Rev.

H. J. Dukinfield Astley warmly asserts its Neolithic origin and attacks Dr. Robert Munro for doubting this view. The weighty arguments of Dr. Munro are parried by Mr. Andrew Lang in his characteristic manner. Those who care to see the present position of this pretty quarrel should consult the current number of the *Reliquary and Illustrated Archaeologist*. Doubtless the problem will be threshed out in Section H of the British Association at the meeting in Glasgow in September next.

THE "Picts' houses" of Scotland are a perennial source of discussion to antiquaries, and Mr. David MacRitchie, who has long studied the Pictish question problem, describes in the *Reliquary and Illustrated Archaeologist* (vol. vii. 1901, p. 89) a series of interesting complicated bee-hive huts round which earth has been heaped. Mr. MacRitchie suggests that the series is as follows:—(1) The primitive subterranean "Picts' houses," consisting of one or more chambers and reached by a low narrow gallery. (2) Circular buildings with several chambers round a central one, the walls rising to a height of 12 to 15 feet and culminating in a "bee-hive" roof. (3) Brochs or forts, similar in ground plan to the last, rising as ring-like towers, with staircases in the walls and the central area unroofed.

THE May number of the *Physical Review* contains a good portrait of the late Prof. Fitzgerald, reproduced by photogravure. Dr. Larmor contributes an appreciative notice of the life and work of the lamented investigator, whose death all men of science sincerely deplore.

Feilden's Magazine will celebrate its second anniversary on the first of next month. During its short life it has shown what a good engineering magazine can be, and has maintained a high standard both in its first-class illustrations and in its text, which has been graphic and well up to date. On this account we are glad to express the wish that its future may be long and prosperous.

THE fifth part of "A Manual of Surgical Treatment," by Drs. W. Watson Cheyne, F.R.S. and F. F. Burghard, has been published by Messrs. Longmans, Green and Co. The subject is the treatment of the surgical affections of the head, face, jaws, lips, larynx and trachea, and one of the main divisions is on the intrinsic diseases of the nose, ear and larynx, by Dr. H. Lambert Lack. Dr. A. Whitfield gives an account of the method of removing superfluous hairs by electrolysis. The negative electrode from a battery of about five Leclanché cells is connected with a needle which is introduced into the neck of the hair follicle. The patient is then instructed to grasp firmly the positive electrode, and after a few seconds bubbles of hydrogen can be seen issuing from the mouth of the follicle. Shortly afterwards the needle is withdrawn, and after a moment or two the hair may be pulled out very easily. If the operation has been successful, Dr. Whitfield says that the hair will slide out of the follicle without offering the slightest resistance, and will bring the inner root-sheath with it. About forty hairs can, on the average, be taken out at one sitting.

THE additions to the Zoological Society's Gardens during the past week include a Campbell's Monkey (*Cercopithecus campbelli*) from West Africa, presented by Mrs. Morrell; a Lion (*Felis leo*, ♂) bred in Ireland, presented by Mr. Rowland Ward; an Alligator (*Alligator mississippiensis*) from Southern North America, presented by Mr. W. S. Foster; four Crossed Snakes (*Psammophis crucifer*), a Rough-keeled Snake (*Dasypeltis scabra*), two Rufescent Snakes (*Leptodira hotamboeia*), five Rhomb-marked Snakes (*Trimerorhinus rhombeatus*) from South Africa, presented by Mr. A. W. Guthrie; five Red-headed Weaver-birds (*Foudia madagascariensis*) from Madagascar, two Yellow-rumped Seed-eaters (*Crithagra sulphurata*) from South Africa, six Waxbills (*Estrelda cinerea*) from West Africa, two Nutmeg Birds (*Munia punctularia*) from India, presented by Mr. E. S. Foot; two Antillean Boas (*Boa diviniloqua*) from St. Lucia, presented by Mr. Walter Graham; an Algerian Skink (*Eumeces algeriensis*) from North Africa, presented by the Rev. F. Jervis-Smith, F.R.S.; two Peba Armadillos (*Tatusia peba*), three Brazilian Tortoises (*Testudo tabulata*), a Blue and Yellow Macaw (*Ara ararauna*) from South America, a Short-billed Toucan (*Ramphastos brevicarinatus*) from Central America, a Reticulated Python (*Python reticulatus*) from the East Indies, six Spiny-tailed Mastigures (*Uromastix acanthinurus*), three Grey Monitors (*Varanus griseus*) from North Africa, deposited; a Lion (*Felis leo*, ♂) bred in Ireland, received in exchange; two Crested Screamers (*Chauna cristata*) from Buenos Ayres, two Hoopoes (*Upupa epops*), European, a White-fronted Amazon (*Chrysotis leucocephala*) from Cuba, two Red Under-winged Doves (*Leptoptila rufaxilla*) from Guiana, purchased.

OUR ASTRONOMICAL COLUMN.

THE TOTAL SOLAR ECLIPSE, MAY 18, 1901.—Since the provisional telegraphic reports immediately after the eclipse there has been little further information as to the exact procedure of the various parties, but an article in the *Times* of July 20, 1901, gives a more comprehensive series of particulars.

Considering the adverse meteorological conditions, the observations in general must be classed as successful, as out of the fifteen stations occupied along the line of totality, determinations of some kind were made at thirteen places. In respect to the special investigations based on the unusually long duration of totality, however, the results are practically useless. Chief among these unsuccessful attempts were the large scale photographs of corona by Prof. Barnard, the spectroscopic determination of the rotation of the corona by Messrs. Newall, Wilterdinck and Baume Pluvinel, and the determination of heat radiation from corona by Dr. Abbott and Prof. Julius.

The photographs of the region round the sun for recording stars, &c., to be used in searching for possible intramercurial planet were more successful, good results being obtained by Prof. Perrine at Padang and Mr. Dyson at Auer Gadang.

The polariscopic investigations were only partly successful; visual observations were secured by Prof. Julius, and a series of photographs obtained by Mr. Newall with a Savart camera.

In the case of the chromospheric spectrum, several observers have secured more or less successful photographs. At Fort de Kock Dr. Humphreys has obtained good spectra of the lower chromosphere, using a concave grating, the whole blue and violet range of spectrum being on a film two feet long.

Mr. Newall, assisted by Lieut. Briggs, used an objective plane grating and obtained a series of spectra with high dispersion over a small range.

Dr. Mitchell also obtained a valuable series of spectra of the flash by means of a grating spectroscope.

Good series of photographs with prismatic cameras were obtained by the Dutch party at Fort de Kock, M. de la Baume Pluvinel, M. Donitch, and also by Mr. Maunder at Mauritius.

Numerous photographs of the corona and surroundings were obtained with various forms of cameras, but it is improbable that any of these taken in Sumatra will show any considerable extension of the streamers, and reliance will have to be made in this branch upon the photographs taken under the more favourable conditions at Mauritius. In Sumatra, series of large scale pictures were obtained with 40-feet lenses by Prof. Nyland, Mr. Perrine and Dr. Humphreys. Prof. Todd failed to even see the corona at Singkep on account of heavy clouds.

From an examination of the plates it is stated that they show a remarkable feature indicating a huge local storm in the eastern equatorial regions, and several bright arches apparently related to marked prominences, especially in the S.E. quadrant.

The duration of totality again appears to have been considerably different from the computed ephemeris time, the observed time in most cases being *shorter*. The Dutch astronomers at Painan report it about eleven seconds, and Mr. Dyson about nine seconds shorter than the almanac duration. Other observers, however, including Prof. Burton and the Fort de Kock party, appear to have found the time of totality longer than was predicted.